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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/898,909	07/03/2001	Detlef Weber	12816-021001/S1166	9573
26161	7590	06/30/2004	SB/flu	
FISH & RICHARDSON PC 225 FRANKLIN ST BOSTON, MA 02110			EXAMINER CAO, PHAT X	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 06/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/898,909	<b>Applicant(s)</b> WEBER, DETLEF	
	<b>Examiner</b> Phat X. Cao	<b>Art Unit</b> 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 14-27 is/are pending in the application.
- 4a) Of the above claim(s) 14-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/8/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 21-23 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeng et al (US. 5,744,865) in view of Sethi et al (US. 5,573,973).

Jeng (Fig. 1-7) discloses a method for fabricating a metallization arrangement for a semiconductor structure, the method comprising: providing a first metallization plane 28 on the semiconductor structure 12 having an electrical circuit 14 (Fig. 5); providing a first intermediate dielectric 30 on the metallization plane 28 (Fig. 6), the first intermediate dielectric 30 made of silicon dioxide and having a first dielectric constant; providing a liner layer 16 made of diamond dielectric material on the first intermediate dielectric 30 (Fig. 7) and having a second dielectric constant; providing via holes 18 in the first intermediate dielectric 30 and the liner layer 16 (Fig. 7), the via holes 18 being filled with a conductive material, thereby completing a first resulting structure; providing a second metallization plane on the first resulting structure, the liner layer 16 acting as a diffusion barrier for the second metallization plane; patterning a first interconnect and a second interconnect 22 in the second metallization plane by using a mask; completely interrupting the liner layer 16 between the first and second interconnects 22 by common etching step (column 4, lines 22-28), thereby forming an interspace between the first

and second interconnects 22 for preventing capacitive coupling between the first and second interconnects (column 4, lines 22-40); and a dielectric 26 in the interspace.

Jeng does not specifically disclose that the liner 16 made of diamond has the dielectric constant greater than the first intermediate dielectric 30 made of silicon dioxide.

However, Sethi teaches that as recognized by one skilled in the art, the diamond would have much higher dielectric constant than silicon dioxide (column 3, lines 54-61). Therefore, the liner 60 made of diamond would have the dielectric constant greater than the first intermediate dielectric 30 made of silicon dioxide.

3. Claims 21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pio (EP. 0 989 609 A1 – previous cited in IDS filed on 1/4/02) in view of Jeng et al (US. 5,744,865).

Pio (Fig. 8) teaches a method for fabricating a metallization arrangement for a semiconductor structure, the method comprising: providing a first metallization plane 42 on the semiconductor structure; providing a first intermediate dielectric ILD 45 of low dielectric constant silicon dioxide on the first metallization plane; providing a liner layer 46 made of silicon nitride on the first intermediate dielectric and having a high dielectric constant which is greater than the low dielectric constant of the first intermediate dielectric ILD of silicon dioxide; providing via holes in the first intermediate dielectric ILD 45 and the liner layer 46, the via holes being filled with a conductive material 58, thereby completing a first resulting structure; providing a second metallization plane 62 on the first resulting structure, the liner layer 46 of silicon nitride acting as a diffusion

barrier for the second metallization plane ; and patterning first and second interconnects 61 and 62 in the second metallization plane by using a mask thereby forming an interspace between the first and second interconnects (column 5, par. [0023]).

Pio does not disclose that the liner 46 in the inter-space between the first and second interconnects 61/62 is removed.

However, Jeng (Fig. 7 and column 4, lines 22-31) teaches the forming of a second metallization plane by patterning the first and second interconnects 22 and by completely interrupting the liner layer 16 in the inter-space between the first and second interconnects 22. Accordingly, it would have been obvious to include in Pio's process the step of interrupting the liner layer in the inter-space between the first and second interconnects because as taught by Jeng, such step would prevent capacitive coupling between the first and second interconnects (column 4, lines 28-40).

### ***Response to Arguments***

4. The rejection under 35 U.S.C. 103(a) as being obvious over Applicant's admitted prior art is withdrawn because of a rule 1.132 declaration stating the common ownership of the invention. However, the new reference issued to Pio (cited by Applicant in IDS filed 1/4/02) is applied to show the obviousness of the invention as claimed.

Applicant argues in the remark filed on 9/12/03 that Jeng fails to teach the claimed method of forming a liner layer having a second dielectric constant greater than the first dielectric constant of the first intermediate dielectric.

This argument is not persuasive because as clearly stated in the ground of rejection that Jeng does teach the forming of the liner layer 60 of diamond having a

second dielectric constant greater than the first dielectric constant of the first intermediate dielectric 30 made of silicon dioxide.

***Conclusion***

5. Applicant's submission of Declaration under rule 1.132 on 4/7/04 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

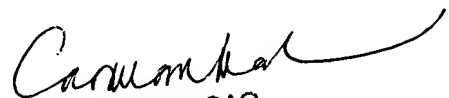
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (571) 272-1703. The examiner can normally be reached on Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2814

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PC  
June 25, 2004

  
PHAT X. CAO  
PRIMARY EXAMINER